Exercise and Whey Protein Supplementation as Adjunctive Therapy for Patients with Prostate Cancer Receiving Androgen Deprivation Therapy

Abstract

Androgen deprivation therapy (ADT) is the mainstay of treatment for recurrent or metastatic prostate cancer with approximately 45% of men receiving ADT during the first year after diagnosis. ADT lowers circulating testosterone to castrate levels in an effort to impede testosterone-driven tumor progression. Yet, as a direct consequence of ADT, numerous adverse effects occur. The primary complications are sarcopenic obesity, characterized by a decrease of muscle and increase in fat, and bone loss. Diminished bone mass increases the risk of osteoporosis and fracture, while muscle loss compromises strength and physical function. The subsequent loss of mobility resulting from physical impairment impacts the long-term functional status of prostate cancer patients, and contributes to rising medical costs for continuing care. Resistance exercise training (RT) may serve as key therapy in improving quality of life of patients undergoing ADT. The limited RT interventions completed to date in prostate cancer patients have attenuated, rather than reversed, muscle and bone loss. Furthermore, the benefits of whey protein supplementation (WPS) combined with RT are largely uninvestigated in this population. Therefore, we hypothesize that a 12-week RT and WPS intervention in men with prostate cancer receiving ADT will improve treatment-related declines in physical function, positively alter muscle and bone mass, and increase expression of PGC-1α4, a novel transcriptional coactivator shown to be resistant to the muscle-wasting of cancer. Because the roles of PGC-1α4 and other myogenic regulators remain unresolved in response to exercise in prostate cancer patients, we propose the use of a computational model to infer the relative importance of mechanisms modulating the activation of anabolic signaling pathways. Thus, 32 prostate cancer patients on ADT will be randomized to one of four treatment groups: RT, RT+WPS, WPS, or standard-of-care. Our findings may provide the basis for future adjunctive therapy to reverse musculoskeletal loss, increase physical functioning and improve quality of life during treatment periods.